

# CHANGES IN WEATHER BUREAU PROGRAM OF METEOROLOGICAL OBSERVATIONS.<sup>1</sup>

The present program of meteorological observations by the Weather Bureau was put into effect forty-odd years ago; it was organized with special reference to the daily forecasts and warning service and, needless to say, no material changes therein have been made unless dictated by consideration of the forecast service. For some years past, however, it has been recognized within the bureau, and to a less extent without, that a series of observations and reports which may be eminently satisfactory as a basis for weather forecasts and warnings may not be well adapted to the study of many problems in which the weather plays an important part.

For this and other reasons a committee (Prof. A. J. Henry, chairman) of Central Office officials was appointed on November 1, 1916, to consider the observational work of the bureau and report what, if any, revision or extension is practicable.

The committee has submitted its report and the latter has been approved, effective January 1, 1918.

It seems desirable that a brief preliminary statement be made at this time with reference to the changes that are in contemplation.

For several reasons, chief of which is the press of other important work, the ideal observational program can not be adopted, but the committee has recommended a few minor additions to the present program which it is believed will not greatly augment the present volume of work at stations. These additions are as follows:

(1) The making of an observation of relative humidity and cloudiness at all principal stations at the uniform hour of noon, local mean time;

(2) The compilation of wind direction and velocity from the automatic record sheets at selected stations;

(3) The collection of statistics of hail, thunderstorms, and tornadoes in greater detail than at present.

While the present program permits the taking of a midday observation of humidity, the time of taking it is optional with the official in charge. The change recommended and approved requires an observation at the uniform hour of noon, local mean time, to which is added a deliberate observation of the clouds, their direction and approximate speed, made with all the skill that is at the command of the observer.

There is perhaps greater need of improvement in current methods of cloud observation than in the observation of any other single element. This arises not alone from the fact that such data is of value in the study of dynamic meteorology; but especially because aerial navigation has now become a so important practical matter. The classification or naming of the clouds by observers in accordance with the standard nomenclature is particularly in need of improvement and the ability to distinguish between upper and lower clouds should also be studiously cultivated. The plan contemplates the use of a nephoscope in determining cloud motions at the noon hour, and eventually that apparatus will be used in all cloud observations whenever conditions permit.

In compiling data of wind direction and velocity from each of the eight principal points of the compass, as was formerly done, the object is to secure more detailed information as to the movement of the surface winds than is made available by the present system.

The details of the thunderstorm campaign will be announced later. The general plan contemplates the

enlistment of a large number of thunderstorm observers throughout a zone, say, 200 miles wide, extending from Iowa to New England, thus forming part of a trans-continental air route. It will doubtless be necessary to extend the network of thunderstorm observations over other zones.

The taking of phenological observations was favored by some, but since that subject is, and has been, in conference in the Interbureau Committee of the Department, no action was taken by the program committee.

## THE WEATHER BUREAU AND THE WAR.<sup>1</sup>

The use of aeroplanes, dirigible and captive balloons, highly perfected and powerful artillery, noxious gases, and other modern methods of warfare in Europe to-day [1914-1917] have emphasized the importance of foreknowledge of existing weather conditions both on the earth's surface and to some considerable distance aloft. Recognizing the value of such knowledge to those planning military operations, and following the example set by all the other belligerents of to-day, the Secretaries of Agriculture and of War have arranged for full cooperation between the United States Weather Bureau and the Army.

The military activities of the Weather Bureau for the time being resolve themselves into two primary projects: (1) Forecasting the weather for purely military operations; (2) the sounding of the upper air for the benefit of aviators, balloonists, and artillerymen.

In connection with the first project, District Forecaster E. H. Bowie, of the Washington office, has been commissioned a major in the Signal Officers' Reserve Corps and has been granted a furlough from the Weather Bureau on that account. It is understood that Maj. Bowie will be assigned to the staff of General Pershing, as principal forecaster. In the furtherance of his duties it is expected that the closest cooperation will exist with the French and English meteorological services in the use of data and reports obtained by them, supplemented by additional observations in the field and cable reports from the United States and its possessions. It is likely that Maj. Bowie will remain in Europe during the period of the war.

Dr. William R. Blair, meteorologist, who has been in charge of the aerological investigations of the bureau, has also been commissioned a major in the Signal Officers' Reserve Corps and placed in charge of the military aerological work. The aerological work heretofore performed by the Weather Bureau will be continued, in addition to the enlarged activities made possible by the appropriation of \$100,000 for this work, as contained in the Army bill which became a law May 12, 1917. This item reads as follows:

For the establishment and maintenance by the Weather Bureau of additional aerological stations, for observing, measuring, and investigating atmospheric phenomena in the aid of aeronautics, including salaries, travel, and other expenses in the city of Washington and elsewhere, \$100,000, to be expended under the direction of the Secretary of Agriculture.

The work to be conducted by Maj. Blair in the Signal Corps will include the taking of observations of the upper air, for the immediate benefit of aviators, artillerymen, etc. This work will be continued, not only at the front, but at military camps in the United States. It is planned that, for the duration of the war, the aerological work of the Weather Bureau and the Signal Corps shall be closely

<sup>1</sup> Condensed from the fuller preliminary report by Prof. A. J. Henry in "Weather Bureau Topics and Personnel," Washington, August, 1917.—EDITOR.

<sup>1</sup> Condensed from an article by Edgar B. Calvert in "Weather Bureau Topics and Personnel," Washington, August, 1917.—EDITOR.

coordinated, and that such of the free-air observations made at the six primary stations to be operated by the Weather Bureau, as may be required, shall be made telegraphically available to the military authorities, supplementing similar observations made at the various military stations conducted independently by the Signal Corps. All the data secured at the Weather Bureau and the military stations will be turned over to the Weather Bureau for tabulation and study.

Five aerological stations, in addition to the one already maintained at Drexel, Nebr., are being established as rapidly as possible. One of these stations will be located at Ellendale, N. Dak., and the work in connection therewith has progressed to such an extent that it is expected that it will be in full operation before October 1, 1917. The sites for the other stations have been tentatively selected and the announcement of the exact location will be made later.

#### NORMAL ANOMALIES OF MEAN ANNUAL TEMPERATURE VARIATIONS.<sup>1</sup>

By H. ARCTOWSKI.

[Reprinted from Science Abstracts, Sect. A, July 30, 1917, §591.]

When mean daily temperatures are plotted to form an annual curve certain discontinuities are often observed. Attention has frequently been called to a sudden fall of temperature which often occurs in the spring, particularly in May or June, but it has not been so generally recognized that similar rises of temperature occur in autumn. These discontinuities suggest that the mean annual curve is formed of portions of several smooth curves, the transition from one to the next being brought about by a sudden change as shown in the figure [omitted]. These component curves have not necessarily all the same amplitudes, though in some cases they will be similar and the one simply be displaced up or down from the other. It is suggested that these changes from one curve to another may sometimes be due to a sudden change in the amount of atmospheric moisture above the station with a consequent alteration in the strength of the solar radiation received. There is evidence that the steps occur at approximately the same date at such widely separated stations as Baltimore, Md., in North America, and Barnaul, in Siberia.—*J. S. Di[nes]*.

#### STRUCTURE OF HAILSTONES OF EXCEPTIONAL FORM AND SIZE.<sup>2</sup>

By F. E. LLOYD.

[Reprinted from Science Abstracts, Sect. A, July 30, 1917, §594.]

A violent hailstorm of short duration at Carmel, Cal., [—, 1916], yielded large hailstones of unusual shape. Around a central core radiating arms projected having the form of icicles. It is suggested that the stones in the course of their formation were rotating, and thus the arms were built up by the throwing out of the water centrifugally. The suggestion is offered that when hailstones of exceptional type fall molds might be made by pressing plasticine around them before the ice has time to melt, and thus a permanent record of their shape would be obtained.—*J. S. Di[nes]*.

#### IMPROVED METHODS IN HYGROMETRY.<sup>1</sup>

551.508.7 (048) By A. N. SHAW.

[Reprinted from Science Abstracts, Sect. A, May 26, 1917, §365.]

A hygrometer of a type recently developed by E. K. Rideal and A. Hannah was tested and very satisfactory results obtained. In this instrument a known volume of the sample of air is drawn into the apparatus and the decrease in volume at constant pressure is determined after drying on sulphuric acid. The vapor pressure can be calculated in a few seconds from the reading of the instrument and the barometric pressure at the time. It was found that each observation required only from 2 to 4 minutes and an accuracy within about 1 per cent was obtained, whether the temperature and humidity were high or low.

The principle of a second type of hygrometer tested was based on the fact that certain salts will absorb water from the atmosphere in an amount which is closely proportional to the vapor pressure existing at the time. A clean filter paper moistened with a solution of  $P_2O_5$  was suspended in a bottle from one arm of a balance. A constant stream of air was drawn through the bottle, and it was found that the humidity could be determined satisfactorily from the weight of the paper. The apparatus required to be calibrated by comparison with a standard method, but this once done the paper was found to remain without deterioration for a long time. A convenient form of the instrument can be constructed by hanging the paper from a sensitive spring balance in a tube open at both ends, the air circulation being maintained by a small pilot light in the top of the tube. The spring balance can be graduated to read in vapor pressure directly.—*J. S. Di[nes]*.

551.57 (048)

#### FACTORS INFLUENCING THE CONDENSATION OF AQUEOUS VAPOR IN THE ATMOSPHERE.<sup>2</sup>

By A. MASINI.

[Reprinted from Science Abstracts, Sect. A, July 30, 1917, § 587.]

Experiments on the condensation of water vapor in the air under different conditions give the following results: The formation of the nuclei which, besides dust, may provoke the condensation of atmospheric aqueous vapor is determined specially by the presence of ozone, nitrogen peroxide, and indirectly ammonia. Electrical discharges, flames (independently of their fumes) and glowing bodies favor condensation in so far as the above substances are formed in their neighborhood. The property exhibited by some substances, of distributing fumes in the air, is identified with the phenomenon of deliquescence, the latter property being manifested without the surrounding medium being saturated with moisture. The conception of a medium saturated with vapor is, at any rate in practice, of relative and not absolute character. This relativity is implied by Kelvin's law, according to which the condensation or dew point depends not only on the vapor pressure but also on the radius of curvature of the surface of bodies in the immediate neighborhood of particles of vapor; it must now be extended to the consideration of the nature of these bodies and of their distance from molecules of the vapor.

Contrary to the conclusions of Lenard and Ramsauer, the action of the ultra-violet light is not necessary for the formation of the nuclei and functions only as a source

<sup>1</sup> Amer. Jour. sci., May, 1917, 43:402-409; Phil. mag., June, 1917, 33:437-495.  
<sup>2</sup> Trans., Roy. Soc. Canada, Sept., 1916, 10:47-50.

<sup>1</sup> Trans., Roy. Soc. Canada, 1916, 10:35-92.  
<sup>2</sup> Nuevo Cimento, —, Sept., 1916, 12: 110-129.